BIO-DYNAMICS

A periodical furthering soil conservation and increased fertility in order to improve nutrition and health.

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BIO-DYNAMICS

A Short, Practical Introduction

EHRENFRIED E. PFEIFFER

What Biodynamic Farming and Gardening Stands For.

The Biodynamic Farming and Gardening Method has grown and developed, since 1922, on a foundation of advice and instruction given by the late Rudolf Steiner, a philosopher known for his world-view called Anthroposophy (wisdom of man).

The name "Biodynamic" refers to a "working with the energies which create and maintain life". This is what was meant in the name given it by the first group of farmers inspired by Rudolf Steiner to put the new method to field use as well as practical tests. They decided to call it "Biodynamic". The term derives from two Greek words "bios" (life) and "dynamis" (energy). The use of the word "method" indicates that one is not dealing merely with the production of another fertilizer, organic though it is, but rather that certain principles are involved which in their practical application secure a healthy soil and healthy plants—which in turn produce healthful food for man and healthy feed for animals.

What Are the Biodynamic Principles?

1. To restore to the soil the organic matter which it needs so badly in order to *hold* its fertility in the form of the very best humus.

2. To restore to the soil a balanced system of functions. This requires our looking at the soil not only as a mixture or aggregation of chemicals, mineral or organic, but as a living system. We speak therefore of a *living soil*, including here both its microlife and the conditions under which this microlife can be fully established, maintained and increased.

3. While the Biodynamic Method does not deny the role, and importance, of the mineral constituents of the soil, especially the so-called fertilizer elements and compounds that include nitrogen, phosphate, potash, lime, magnesium, and the trace minerals, it sponsors the most skillful use of organic matter as the

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basic factor for soil life. (It is of interest that the importance of the finer elements, the trace minerals, for health and normal growth was actually pointed out by Rudolf Steiner as early as 1924.)

However, the Biodynamic Method is more than just another organic method. It stands for a truly scientific way of producing humus. Not merely the application of "nothing but" organic matter in a more or less decomposed form is intended, but the use of the completely digested form of crude organic matter known as *stabilised, stable* or *lasting humus.* In this aim the method differs from what is commonly called "organic" farming. In the latter, any collection of any organic matter is apt to be called compost. In the B.D. Method the organic material to be used as a basis for compost is transformed either by means of the so-called Biodynamic Preparations, or recently in the U.S.A. by means of the B.D. Compost Starter (Dr. Pfeiffer's formula).

It should not be forgotten that at the time of the creation of the method, during the years 1922-24, and afterwards during the years of experimental and empirical trials (from 1924 to about 1930), agriculture was dominated by the agricultural-chemical concept based on J. v. Liebig's research with regard to the major mineral fertilizer elements. A one-sided situation had developed. Nitrogen, phosphate, potash, lime were considered the only important fertilizers and the trace minerals were ignored. Barnyard manure was looked down upon as an unimportant factor, frequently as a nuisance which had to be disposed of one way or another.

A fundamental change in the estimation of the value of manure and compost has taken place since 1930, increasingly since 1940, and of the trace elements since 1950. This has gone so far that manure and compost have now been restored to their proper, all-important position in modern agriculture, even in the orthodox school.

4. Since in the Biodynamic Method we speak not only of fertilizer but of the skillful application of all the factors contributing to soil life and health, it is necessary to understand that life is more than just chemicals (inorganic and organic). Life and health depend on the interaction of matter and energies. A plant grows under the influence of light and warmth, that is, *energies,* and transforms these energies into chemically active energies by way of photosynthesis. A plant consists not

only of mineral elements, i.e. inorganic matter—these elements make up only 2-5% (in a few wild plants and weeds up to 10%) of its substance—but also of organic matter such as protein, carbohydrates, cellulose, starch, all of which derive from the air (carbon dioxide, nitrogen, oxygen) and make up the major part of the plant mass aside from water, namely 15-20%. The greater part of the plant mass, some 70% or more, consists of water.

5. The interaction of the substantial components and energy factors forms a balanced system. Only when a soil is balanced can a healthy, i.e. well balanced, plant grow and transmit both substance and energy as food. We live not only from substance (matter), we also need energies (life-giving and life-maintaining). It is the aim of the Biodynamic Method, or Concept, to establish a system that brings into balance *all* factors which maintain life.

6. Were we to concentrate only on nitrogen, phosphate and potash, we would neglect the important role of biocatalysts (f.i. the trace minerals), of enzymes, growth hormones and other transmitters of energy reactions. As noted previously, already in 1924 Rudolf Steiner had called our attention to the important role of the finer elements, (now called trace elements), in connection with health and proper physiological functioning. Today this is common knowledge. Enzymes and growth substances are likewise important. In the Biodynamic way of treating manure and composts the knowledge of enzymatic, hormone and other factors is included.

7. In order to restore and maintain the balance in a soil a proper crop rotation is necessary. Soil-exhausting crops with heavy demands on fertilizing elements should alternate with neutral or even fertility-restoring crops—on the farm as well as in the garden, and even in the forest.

A soil which has been put to maximum effort, producing corn, potatoes, tomatoes, peppers and cabbage, for instance, (all of them greedy crops), should have a rest period with restoring crops such as all the legumes. Temporary cover with grass and clover pastures helps to improve the humus and nitrogen situation. Exhausting crops and arable cultivation consume humus. The soil must be given time to build it up again.

The Biodynamic Method therefore has emphasized the importance of crop rotation from its very beginnings. Cover crops and green manuring also play an important role in it.

8. The entire environment of a farm or garden is of importance too. It is obvious that polluted air loaded with the breakdown products of industrial and city combustion, gasoline and oil fumes, sulfuric acid, can be detrimental to plant growth. It is less obvious that many other environmental factors also affect the functioning of a biological system. Deforested hillsides are exposed to erosion. The water balance may be destroyed in such cases. The ground water level has dropped. The results of man-made deserts are only too well-known. To restore the most beneficial environmental conditions (forests, wind protection, water regulation), has been an important aim of the Biodynamic Method from its earliest years. Had the method been accepted before 1930, it can be truly said that no soil conservation agencies would have been needed later on, in 1935 and the following years.

9. The soil is not only a chemical, mineral-organic system, but it also has a physical structure. The maintenance of a crumbly, friable, deep, well-aerated structure is an absolute must if one wants to have a fertile soil. All factors which lead to structural disintegration of the soil (f.i. plowing of a too wet soil, and especially the deep plowing of wet clay soils) and what causes the formation of separating layers (hardpan), are things that have to be known. The Biodynamic Method is very specific about the proper cultivation of the soil in order to avoid structural damage. Many a farmer, even among the organic farmers, has defeated his aim by ruining the soil structure through unskillful cultivation.

The Practical Application of the Biodynamic Method. (Is it Something for Only a Privileged Few, or can it be used by Everyone?)

It has been said by persons outside B.D. circles that the Biodynamic Method represents the cream of organic farming principles. This does not, however, mean that the method is restricted to a small group. It can be applied easily by anyone who cares to improve his handling of manure, composts, soil cultivation and crop rotation.

The steps to be taken:

A. Build, and properly treat, manure and compost piles. Do not waste any organic offal. Do not burn leaves and trash, but compost them. Collect everything. Do not

apply crude, undecomposed organic matter to the fields or garden, but make use of the beneficial effects of microlife by first composting manure and all other organic material. Apply—immediately prior to planting or seeding—only predigested material which will not tie down nitrogen, phosphate and other fertilizer elements but will increase their availability. The use of the Biodynamic Compost Preparations or B.D. Starter will greatly help in reaching the goal: good humus.

B. Introduce soil-protecting crop rotations and cover crops.

C. Introduce green manuring, but take care that the green manure crop is properly plowed or disked under without tying down the soil life and nitrogen. In a garden, or wherever feasible, introduce mulching.

D. Improve your soil cultivation practices.

E. Establish proper environmental control, wind protection, good drainage, control of the watershed.

Is It a Costly Procedure to Introduce the Biodynamic Method?

It is true that the building of compost piles requires some extra labor. However this can be timed so that it does not interfere with the rush work on the farm. If one considers that by proper handling of manure and compost there will be no losses of soluble nutrients, the labor is well spent. If one considers further that the application rate of treated, well-rotted humus-compost is less than that of fresh manure or crude compost, it is obvious that time otherwise spent in spreading and travelling over the fields is saved at the moment when time counts most.

In the long run the extra labor and expense for composting is well spent and will be returned in savings of nutrients and of time at other phases of the farm and garden work, including even the need of less cultivation since one gets a more friable humus soil.

The fertilizer value of manure and compost can be considerably increased by the Biodynamic Method. Humus-building techniques also will help the fertilizer effects to last longer.

Is It Possible to Make a Farm Entirely Self-Sufficient with Regard to Fertilizer Elements? (Or does one still need to buy supplements from the outside?)

These questions can be answered only in each specific instance. If there are deficiencies, they must be taken care of. However, the application of the Biodynamic Method enables the farmer to reduce deficiencies to the minimum. Humus deficiency is the most important one, because without humus one is not able to hold and build up a soil. This needs to be taken care of first of all. A soil below 1.5% organic matter lives only on a maintenance level. A soil above 2% organic matter begins to build up reserves. Only when the level of continuing existence is reached can one tell how much else is needed.

Many times we find hidden reserves, which need only to be made available. In mineralized soils there are no more reserves.

The answer to the above questions depends also on the crop rotation. Corn-wheat, corn-wheat, over a long period of years can only exhaust a soil, no matter how much organic matter is applied. Soil conserving or protecting years, between exhausting years, are an absolute necessity.

On many biodynamic farms the problem of self-sufficiency has been solved in practice.

Does the Application of the Biodynamic Method Require Special Studies or Efforts?

If somebody is a good practical farmer or gardener he might just as well become a biodynamic farmer or gardener, with the slight added effort indicated above. If he is not up to standard he will have to improve his farming methods. This he must do anyhow if he expects to continue with any degree of success, and he should not think that by using the Biodynamic Method, or for that matter any organic method, he can escape the necessity of improving his general practices.

Expert advice is available through the Bio-Dynamic Farming and Gardening Association, Inc., to show any farmer or gardener how to start improving his practices from the biodynamic point of view. The first step is always to make a survey and to take inventory of your particular situation in order to plan intelligently.

Why, Then, Is Biodynamic Farming Still So Little Known and Practiced?

Biodynamic Methods were well known to those who fought them—in the Liebig fertilizer camp. To them they must have appeared a real danger. This was 20 to 30 years ago. Now the understanding for biological balance and organic principles is common knowledge and generally accepted.

There is, however, a reason why the Biodynamic Method did not spread. It is based on human nature and is not an agricultural problem. It is about the most difficult thing imaginable for human beings to change old habits, old customs, and (in the problem we are concerned with here) to begin to think in terms of biological balance, soil life and health, rather than of NPK only.

The Biodynamic Method has no single recipe to offer, but requires some coordination of farm planning on a long-range program.

Then there is the fact that many farmers think only in terms of quantity yield, not quality. Only such methods are put to use which promise bigger yields.

The yield depends on many factors beyond the control of applied Biodynamics: water supply, too much rain or drought, seed quality, and above all the farmer himself. What we *can* do is show that soil improvements *have* been obtained, that biodynamic farmers have very little trouble with livestock and plant diseases (especially having no breeding or sterility trouble), are not bothered with lodging in wet years, produce crops with maximum protein and vitamin contents. This we know: we get the top quality which can be produced. Also, the quantity yield of a good biodynamic farmer has always stood above the average level.

The introduction of the Biodynamic Method therefore goes hand in hand with a striving for better quality. When there is interest in a better quality of food and feedstuffs, the Biodynamic Method is in its proper place. Health conscious people everywhere have always been asking for, and been appreciative of, biodynamic products.

Does Biodynamic Farming Avoid or Make Unnecessary the Use of Poisoning Sprays Against Insect Pests?

We do not claim that the Biodynamic Method completely counteracts insect pests. This would create a false impression. The important question is not: "Are insect pests present?", but rather, "Do they spread out, and do they produce measurable damage?" A few insects may be present, this is always possible. They may be wind-borne, or move in from infected areas. That is bound to happen occasionally. But we have found, in our 30 years of Biodynamic Farming experience, that they definitely did not spread or do great economic damage.

The question of insect pests is one of biological balance and control. Poisoning sprays have not solved, nor can they solve, the problem. If the biological balance is restored the situation will be entirely different.

Where Can One Read More About the Biodynamic Method?

There is the volume "Bio-Dynamic Farming and Gardening", by E. E. Pfeiffer, at present out of print but to be made available again after revision, under the title "Soil Fertility, Its Renewal and Preservation". Also there are the earlier issues of the quarterly, BIO-DYNAMICS, (most of which are still available), and the current numbers which present recent developments. There are obtainable from the B.D. Association a number of leaflets on specific subjects, such as "The Compost Heap".

Please direct all inquiries to

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SUMMER CONFERENCE — 1956

This year's annual Summer meeting and conference of the Bio-Dynamic Farming and Gardening Association, Inc., was an interesting and *interested* gathering from start to finish. Meeting, as has become customary, at Threefold Farm, Spring Valley, N. Y., members and friends, as well as the scheduled speakers, took an active part in the sessions which ran from the afternoon of Friday, July 27th, through Sunday the 29th.

Even the Association's business meeting on Saturday afternoon, sometimes little more than a dull but necessary part of the week-end's business, produced real, and potentially important results. Out of the initiative of a number of the members present there grew a project for definite, concerted activity directed to the enlarging of the B.D. Association.

It is a pleasure to report, to those who were not present at the Conference, that Dr. Donald B. Hull of Ridgewood, New Jersey agreed to head a committee of members in strategic and geographic positions to make efforts to increase the membership. As we go to press, this committee has passed from a mere good idea to an actuality and is starting to function. Dr. Hull wanted it emphasized that *every* member of the Association has the potentiality of getting another member.

Dr. E. E. Pfeiffer had opened the Conference the day before, with a lecture on "Proteins, Enzymes & Growth Promoters." Some notes made during the lecture, by Mrs. Mike Chambers of Black Earth, Wisconsin, and Mr. Peter Escher follow:

Food is more than matter. The total of biological values is greater than the chemicals and calories combined. Nitrogen increases the *yield* of crops, but in this there is no increase in *quality*. However, the scientists by adding minerals can produce a so-called complete plant. This has made it necessary to develop tests to differentiate between chemical and biological processes, and to replace mechanical concepts with biological concepts. Other people also learn: a new Institute, where quality research is being carried on, has been opened in Germany.

As crude protein content rises, the biological values decline.

Even on B.D. farms in the state of transition to the method, it has been found that a potassium shortage can occur, so that potash magnesium has to be added.

Inorganic nitrogen damages the plant by changing protein to carbohydrates. The insects like this.

The biological value of plants is increasingly disturbed by the kind of plant breeding which is practiced. There is, for instance, a tremendous surplus of wheat in the U. S. which is rejected by American as well as foreign bakers as unfit for baking.

It was this decline in the quality of seed, already evident more than three decades ago, which first brought about Dr. Steiner's giving of the Agricultural Course.

Potato skins are rich in Amino Acids. With nitrogen fertilizer and cold weather, the crude proteins are increased. This unfavorable result can be reversed by adding composted, treated, manure.

Different foods vary in value, but the state in which they are used also matters. Legumes are best when mature. The outside leaves of lettuce have a higher biological value than the inside leaves. With kohlrabi, the young leaves are better than the parts usually eaten. Savoy cabbage is preferable to the ordinary cabbage. The leaves of broccoli contain more biological value than the flowers. Other grains contain as much, or in some cases more, biological value than wheat. Excess carbohydrate content of food can make it toxic, as also the excessive protein content that can result from artificial over-fertilization.

When foodstuffs are broken down by enzymes, energy is released. This shows up in off-colors and off-flavors.

In a living cell, 10,000 enzymatic reactions per second take place. The milk of the cow contains more enzymes during the early part of the lactation than toward the end. The biological agent becomes a strong factor in nutrition.

In Russia, composting on the state farms is compulsory, and in their writings it is stated that LIGHT is the *raw material* for the plants, and that the proper breeding of wheat and other seed depends on the proper utilization of the cosmic forces.

Photosynthesis takes place in alternating light and darkness. By altering the time and amount of light artificially, the amino acid pattern can be changed without any change in the soil. On a test with soy beans, using a small amount of light at the wrong time (night), it was possible permanently to destroy the fertility of the seed.

In a firefly, pure phosphorus is freed, but this is immediately neutralized by enzymes to prevent the total burning up of the insect. In the utilization of sugar, the amount of energy released

in the conversion would burn up the body if the bio-chemical action of the body did not immediately tie it down.

In the plant, 80% of the light is transformed into substance. Phosphorus and magnesium act as midwives in the process. All living matter is dead *matter* plus *light*.

Waste materials are a poison. Especially poisonous are waste materials from animal and man. The utilization of plant food in man or animal depends on its complete breakdown into an almost inorganic state before it can be rebuilt. (The animal food eaten by man is predigested and requires less effort.) In this process energy is released, which is used by the body for rebuilding. In man and animal the emotional life also plays its part in all this.

True health is: maintaining a balance between Light processes and processes of darkness.

Dr. Pfeiffer's lecture was followed by a discussion period, and in the evening Dr. E. F. Winter spoke on "Peasant Farming in Austria & Switzerland." This lecture is reported elsewhere in the current number of this quarterly.

Saturday, the second day of the conference was marked by the Association meeting referred to earlier, a visit to the Biochemical Research Laboratory, and three important and interesting lectures. In the morning Mrs. E. Sabarth spoke on "Amino Acids in Plants," and Dr. E. Lehrs on "Light & Matter in Relation to Plant Growth." The evening lecture, by Dr. W. Coda Martin, is presented in the form of an abstract elsewhere in this issue.

Mrs. Richard Gregg, the former Evelyn Speiden, lectured Sunday morning on "Plant Origins and Migrations." In the course of her remarks she pointed out that the difference is often very slight between a plant being a food and its being a poison. Of the same plant family, some can be poisonous, while others are edible.

Mrs. Gregg showed, on a map, the origins of cultivated food plants. The greatest number are from the Near East and the Mediterranean Area. The remainder have originated in the East, in Central and South America and Africa, in that order of importance.

In the next period, Mr. R. G. Schonbeck gave a short report on his experiences in operating the farm of Dr. Pfeiffer at Chester, N. Y. Among other things, he stated that Birdsfoot Trefoil

(a plant that lasts many years without reseeding) is still improving after having been introduced on certain fields 7 years ago. Mentioning his cattle breeding problems, Mr. Schonbeck said he found that having used a bull from a cow with several world records, he got seven inferior heifers. He is now using a bull bred by another Biodynamic farmer, with good results.

Mr. Schonbeck reported that his crops were excellent and his milk production is increasing. When farmers get around to asking questions, his approach is to advise them first to improve the treatment of their manure.

Dr. Pfeiffer's closing lecture, "Food is more than just the sum total of its chemical composition," will appear in the form of a paper in the next number of Bio-Dynamics.

The rest of the day was devoted to reports and discussions. The Conference ended Sunday with an Artistic Evening. Miss Karla Pries gave an excellent performance of Indian Dances. She had studied native dances in India for several years. Appearing on the same program with her were Mr. Amar Sanyal and Mr. Shirish Gor, students at New York University, who gave a recital of Indian music that was also much appreciated by the audience.

FARM CONFERENCE AT GOLDEN ACRES

As we go to press, there is being held at Golden Acres Farm, Newtown, Pa., a Bio-Dynamic Farm Conference, the purpose of which is "to introduce and demonstrate the practical application of the Bio-Dynamic Method in farming and gardening." These sessions, September 21st through the 23rd, will be reported on in the next issue of Bio-Dynamics.

WHEN IS A PLANT A FOOD — AND WHEN A POISON?

(Condensed from a lecture given by W. Coda Martin, M. D., at the 1956 *Conference of the B. D. Association).*

In his very able presentation of this rather startling subject Dr. Martin succeeded in giving us a broader concept of nutrition and the nutritive qualities of plants than usually results from discussions of food and diet. At first glance one might think that it is easy to determine whether a food is poisonous or not. However, the doctor very soon demonstrated to us that it is a much more subtle and complex affair, by building up a working definition of *poison. Medically,* a poison is any substance applied to the body, ingested, or developed within the body, which causes or may cause disease. *Physically* to poison, is to inhibit the activity of a catalyst, that is to interrupt a process, since a catalyst is a minor substance, chemical or enzyme, which triggers a reaction. A final definition from Webster's dictionary, "to exert a harmful influence on — or to pervert" also contains a clue to his description of the conditions necessary before one can call a plant a real food.

Basically, the problem is again that of balance and the active inter-relationships of all the organic factors beginning with the soil and leading through the plant into the human and animal bodies and their metabolic processes. Indeed, Dr. Martin stated that a good food or "quality" food meant to him that it "must have all its essential nutritional ingredients (proteins, carbohydrates, fats, vitamins, minerals and enzymes) and that these must be stable and in harmonious balance." Diagramatically he presented the problem thus:

1. Fertile soil — healthy plant — healthy animals— healthy humans.
2. Poor soil — weak plants — weak animals — weak and degenerated humans.

He then proceeded to demonstrate in example after example the complexity of the relationships as well as the delicacy of the balances involved in the metabolic processes of plants, animals and human beings. The protein molecule, for instance, is composed of as many as 22 amino acids and one of these, Lysine, has been found to be the controller of the use of all the others. "In other words if Lysine is deficient the protein is of little value for nutrition. This means that a plant not having enough Lysine in its protein molecules is a poison. Animals or humans

eating this plant will develop degenerative diseases — that is the architecture of the tissue will be faulty."

Nor is it merely the imbalance in the protein itself that is significant, but the percentage of protein in proportion to the percentage of carbohydrate present in the plant. Readers of this quarterly are familiar with the fact that the protein content of the cereal grains declines with the decreasing fertility of the soil. But what does this mean besides a decrease in nutritive value of the cereals and grains that we and the animals eat?

A serious consideration of the following quotation from Dr. Wm. A. Albrecht leads us in two directions: "The genes of reproduction are not carried from one carbohydrate to another carbohydrate nor from one fat globule to another fat globule but only from one protein molecule to another protein molecule." In view of the declining percentages of protein values does this not point toward ever weaker generations of plants, animals, and people?

Turning to a consideration of vitamins, Dr. Martin showed us that one cannot even think of a vitamin all by itself, without any family ties. "In nature vitamins are bound up with proteins and minerals. In the body vitamins act as catalysts in the enzyme system. An enzyme is composed of a vitamin, a mineral, an amino acid and a phosphate radical." Take away a trace mineral from the soil, you end up with a vitamin deficient plant, take away a trace mineral from an enzyme and you upset the metabolism of the body. "A mineral-deficient land results in mineral-deficient plants. These trace minerals are essential to the enzyme system of the body metabolism. As we go from Colorado Eastward to New York and South to Georgia the soil contributes less to the mineral content of vegetables. As we make this journey, the less well we eat. Supporting evidence is that longevity records reveal that people live longer in the mineral rich areas, in fact, Nebraska has the highest record of longevity."

Another important factor in the enzyme metabolism is the part played by the unsaturated fatty acids. Chemically speaking, "an unsaturated fatty acid has a double bond that is free to combine with certain minerals in the body to form CO enzyme A." However, according to Dr. Martin, our diets are becoming increasingly deficient in these "essential precursors to certain vitamins" due to the manufacturing methods of the present day

introduced to prevent cooking fats from becoming rancid. "The manufacturers add *hydrogen* to the fats in order to saturate these two *bonds*, thus preventing them from joining with oxygen from the air, which causes the fat to become rancid. Everyone is very pleased and feels that science has again come to the rescue with all the *hydrogenated* or saturated fats. But unfortunately no one consulted the metabolism of the body, which requires these unsaturated fatty acids to complete its enzyme system. The body being a very careful engineer rejects these saturated fatty acids as poor construction materials. In many instances the body is able to return unwanted material to the original source, via the kidneys and bowels. There are no facilities to remove these saturated fats from the body, so what happens? They accumulate as fat under the skin, and excess amounts drop out of the blood stream as they are transported around the body and infiltrate the liver and the inner lining of the blood vessels. This is the beginning of a condition known today as *atherosclerosis*. This gradually causes a narrowing of the arteries, especially the coronary artery of the heart. Suddenly the blood is slowed down sufficiently so that it forms a clot. Now the illness is called *coronary thrombosis* or *occlusion*. Everyone says: 'It happened so suddenly'. This is not correct as coronary thrombosis is the final stage of a disease that has been in progress for many years."

Dr. Martin was also careful to point out here that even the beneficial unsaturated fatty acids can be harmful if eaten in excess after middle age. Research has shown that it takes an adult 24 hours to use up such fats as fuel and energy in contrast to the 3 to 4 hour cycle of the young person.

He then went on to describe the results of disturbing another balance through extreme refining processes. "Nature supplies proteins, vitamins and minerals in each plant in quantities sufficient to metabolize the carbohydrate in that particular plant. There is no excess for other added carbohydrates." What happens then, when we eat more and more refined starch and carbohydrates? Then we have an incomplete carbohydrate metabolism which "results in the formation of a *toxic metabolite* such as Pyruvic acid and abnormal sugars containing 5 carbon atoms. Pyruvic acid accumulates in the brain and nervous system and the abnormal sugars in the red blood cells. These toxic metabolites interfere with the respiration of the cells.

They cannot get sufficient oxygen to survive and function normally. In time some of the cells die. This interferes with the function of a part of the body and is the beginning of a degenerative disease. With over 50% of our diet today composed of these refined carbohydrates, does it require a million dollars for research to find out why this generation is developing more and more degenerative diseases?"

After describing several more instances of upset balances and the deleterious end results, Dr. Martin himself confessed to having painted a rather dark picture, but said that he felt it his duty as a physician to make people aware of this critical health problem. And went on to say that "it is only by being conscious of the problem and availing ourselves of such basic information that we can succeed in turning the tide toward better nutrition."

On the hopeful and positive side he pointed toward the growing interest and concern as evidenced by many organizations throughout the country both professional and lay groups such as The American Academy of Nutrition and its lay organization The Nutrition Society, Natural Food Associates, The Organic Farmers of America, Friends of the Land and several other Soil Conservation and Wild Life groups. He then ended by directly addressing those present and through them all the members of our Association in saying that "it is for us, who are aware of the deeper meanings of soil and nutrition, to be the leaders in this new crusade against the physical deterioration of the human race. This is our challenge. What shall we do about it?"

A. P. H.

BOOK REVIEW

THE MINISTER'S VEGETABLE GARDEN and COMPOST, by the Rev. John H. Philbrick and Helen Philbrick. Two pamphlets recently published by the National Town-Country Church Institute, Roanridge, Parkville, Missouri.

Their authors are well known to regular readers of Bio-Dynamics, and we understand that these are the first of a series of pamphlets to be written by the Philbricks. Here are two little books written out of experience. They are practical, and simple,

briefly but clearly explaining the steps from planning a garden to harvesting the crops. They were written primarily for the rural minister with no previous gardening experience, but we recommend them for *any* beginner and even for those who have *had* some experience.

Pamphlet No. 1 "The Minister's Vegetable Garden", gives concise information on all phases of gardening, such as: planning, buying seeds, how, when, where and what to plant, tools, care of the garden, insect pests and what to do about some of them.

There is a section which tells about plants that are wild but edible and can be used to supplement the food supply from the garden.

The pamphlet ends by saying, "Pliny informs us that a husband called a kitchen garden a second dessert, or a flitch of bacon which was always ready to be cut; or a salad easy to be cooked and light of digestion, and judged there must be a bad housewife (the garden her charge) in that house where the garden was in bad order". Which indicates to us that the pamphlet may be named "The Minister's Vegetable Garden" but that it was written also for the minister's wife.

Pamphlet No. 2, "Compost", is also brief, but informative. It tells of the reasons for using compost, how it improves the soil and increases its productivity, always emphasizing the necessity of improving the health of the garden. The authors point out (and, we are sure, again from experience) that in a compost-fed garden there is less trouble from plant diseases and insect pests, and that the food thus raised has better flavor.

Instructions for gathering materials and building the compost heap are given. There are indications as to when, and how much compost to use.

The following quote makes one feel that here are a minister and his wife who are really practicing what they preach, "We have already said, and we repeat here at the end, that nothing takes the place of one's actual experience in knowing how to make and use compost to get the most out of one's gardening efforts. And strange as it may seem, if the gardener allows himself to observe any aspect of his gardening, even compost making, with deep regard and what one might consider a listening attitude, he will find himself becoming increasingly sensitive to small manifestations in other fields."

Ruth Eastman

Mrs. Eastman and her husband, Dr. Wallace Eastman, are excellent biodynamic gardeners of long standing. They have frequently come down to B. D. Conferences at Spring Valley from Hamburg, N. Y., where he practices dentistry and they both garden intensively. In sending the above review along to us, Mrs. Eastman wrote that it would have gotten done even sooner except that she had "harvested some vegetables — done a little weeding — froze (with W's help) beans, beets, corn and lima beans. So far we have frozen 85 quarts beans, 75 pints peas, 43 pints corn, 11 quarts beets, 11 pints lima beans. There will be more limas, beets and corn to do and I want to do some chard if possible. We also have beautiful carrots but will just store them in sand."

PEASANT FARMING IN AUSTRIA & SWITZERLAND

(REPORTED BY PETER ESCHER)

A lecture by Dr. E. F. Winter at the 1956 *B.D. Conference*

The slides with which Dr. Winter illustrated his lecture helped to make vivid not only the mountains and valleys, rivers and forests, among which these people live, but their houses and barns and the people themselves. These are people who work and work, and whose forefathers have worked, not to "conquer" —as we would say today—but to "live with" the ever present mountains and the elements.

The Alpine area of Austria, Switzerland and the adjoining Italian Tyrol and German Bavaria has some 500,000 farm households. Their land is one third useless, one third mountainous and one third merely hilly. The soils are poor, the valleys are few, and for that matter narrow, and the climate is poor. The summers in that area are rainy and the winters are cold, with snow.

The farms are small; a large one may run to 18 acres, many total only 6 to 8 acres. The fields are split up, due to inheritance through many generations, and usually widely separated. The average farmer has to travel 8 and more miles a day from the village where he lives to get to his fields.

The families are closely knit and stick together. They are deeply attached to the land. They have lived more than a thou-

sand years in that area. Soil conservation is not only something that is practiced, but is of prime importance. The area is heavily forested to keep the slopes, that are too steep for meadows, from washing. The principal forests in Western Europe are located there.

From our "modern" point of view these regions are classified as "backward." The various governments have taken this to their hearts and have striven to bring the peasant "up to date." Experiment stations have been set up to help show the way. A lot of advice is given to these farmers at the expense of their native instinct. From their being a proud people, all this has led to a certain sense of inferiority and a feeling of insecurity.

The field crops are oats, rye and potatoes, along with some wheat. In the Southern valleys of the area, corn is grown. Rather than work with the local seed and improve it, recent practice has been to import new varieties of seed. This new seed, however, degenerates fairly rapidly. The result is that more new seed grains have continually to be imported to maintain the yields — and somebody has to pay for it.

The buildings have withstood the impact of our changing world. The materials are what we call "expensive." In the terms of these peasants they require lots of hand labor, and the materials themselves are scarce. Only a certain amount of timber is available, and it is a cash crop which the farmers need to pay for seed, fertilizer and some machinery. Mostly, the buildings are old, and farmers who have lost their barns rebuild the new ones exactly like the ones that they lost due to fire or windstorm.

From these buildings, we can learn some of the old wisdom in farming. Some of the barns, for example, have been faced in such a way as to catch the winds in summer, and the granary is so laid out that the grain is dried by wind. Runaround barns have been used extensively in some of these areas for a long time, although today we look upon them as the latest development and call them "loafing barns."

The present trend in their handling of the barnyard manure shows how the yardstick of these farmers today is "success." If it "works," the farmer does it. The one question he asks is: does it pay? He would rather purchase fertilizer and let his manure leach in the yard. The pile used to be well taken care of, and stand in the yard with the straw "tressed" on the out-

side. Too many farmers now just dump it and regard it more as a nuisance than anything else.

Some of the houses have no chimneys. The smoke from the stove is used to cure the wheat and rye and to dry it slowly during the wet and rainy summer. Certain of the farmers still bake their bread. This is done three times a year.

Many of the houses are built of logs, which gradually acquire a characteristic dark brown color. Some are made of stone, with heavy walls and small windows to keep them comfortable during the long, cold winters. One finds stoves built of tile. Fired from the kitchen, they heat the living room as well.

The impact of the changing economy upon the farmer has not only been through the cash requirements that have been loaded upon him. The tourist trade also has made its inroads. Some farmers sold their "chalets" outright and moved to the city. Others converted theirs into lodging houses to keep up with the times and with the mortgage payments. Land is scarce and expensive, particularly in Switzerland, and the average farmer is heavily mortgaged.

One sees the farm work being done in various ways. One man decided to go modern, sold his 6 horses and bought himself a tractor. He promptly got stuck in a field with it, and had to borrow the neighbour's team to pull him out. Part of the work is done by the womenfolk — in some of the regions the men seem to feel that they need supervision, and watch them work.

The conflict of old and new is a hard one. Many young people move to the cities, while those who stay at home have to face a grim and short-handed fight. Excepting Switzerland, this area has been subjected to two wars in a generation. The men have been away, and what they have seen has led them to disillusionment.

The refugees from the East have, in another way, also left their impact. They still retain more of the older, instinctive knowledge. There was, for instance, one father and son team of "veterinaries" that Dr. Winter encountered while living with the farmers and studying them. These veterinaries have their degree from the "college of knowledge," handed down from father to son. They are known far and wide. Farmers call them when, for example, a cow has swallowed a nail or a piece

of metal. They first carefully find out where the metal is located, and then operate on the cow right then and there while the farmers hold the animal.

The old folks collect firewood to provide fuel for cooking and heat. They also used to gather mushrooms and berries, along with the young children of the family. Nowadays few people seem to do this gathering, and the street markets in the smaller cities and towns, where these wild crops were sold along with other produce, are gradually disappearing. They have given way to parking areas for automobiles whose passengers are visiting the chain store.

The cattle market has become a curiosity for the tourist, who comes by car. The farmers themselves have practically ceased to wear their home-spun and homemade costumes. They wear store clothes and attempt to look like city slickers. The cattle they bring to market used to be sold the world over, and have been foundation stock for herds in many countries. Today many bulls suffer from sterility, while Bangs' Disease and tuberculosis are rampant.

Yet the farmer has to pay his fertilizer bill, and for other needs created by a cash economy, and he worries. Having lost his native instinct, he is unsure of himself. He is losing contact with his soil. The meadows are often overgrazed, with signs of erosion becoming increasingly evident. He still fights to keep the avalanches from tearing down the slopes and filling the valleys with debris.

But a positive solution has to be worked for. The fact is that the crop yields of these mountain farms are small compared to those of the foot hills, let alone the lowlands — and we measure food today by pounds and quarts and bushels. Yet the taste and flavor of the mountain produce is far superior — but not appreciated. Either these farms will be more and more abandoned, or the farmers will have to get paid better for the quality of their produce. They in turn will have to become conscious of these facts, and set out to produce quality rather than quantity.

In discussing the lecture, Dr. Pfeiffer added that erosion has increased on the mountain farms partly because of the use of tractors, that were built for the large fields in the lowlands. He pointed out that it is up to the tractor manufacturers to bring out a small, efficient machine within economic reach. Thus they would do their share in helping the small farm to survive.

He added that the Alpine peasantry is stubborn, yet many farms are being abandoned, and this peasantry is gradually disappearing. In Western Europe and the U.S.A. today, only 11-12% of the population is engaged in farming. With the trend towards fewer and fewer farmers there is a consistently lower quality of food being produced.

As a contrary example, Dr. Pfeiffer took the Azores Islands. There, on volcanic soils, slopes of 25% inclination are tilled successfully, and alfalfa grows in soils with a pH of 5.7. In those islands work is still done by hand, and to some extent with horses. A tractor was imported there, with the compliments of some U. S. Government agency or other. That sole tractor is carefully kept in a museum for the people to behold.

HOW LONG DO SEEDS KEEP?

EHRENFRIED E. PFEIFFER

Seeds do not keep their germinating quality indefinitely. Some lose it rather quickly, other varieties keep it for longer periods of time, but there are limits for every kind of seed. For instance, red clover keeps well for 2 years, but its power of germination fails after from 3 to 6 years. The story of the "mummy" seed from ancient tombs, which keeps for thousands of years, is not supported by any evidence out of present day experience.

Wheat, if of the best quality, germinates up to 100% in the first year. The same wheat, after 3 years, still had 97% germination, but after 9 years the figure had dropped to 3%. Oats lasts longer, with 87% in the eighth year as against 97% in the first year. Rye holds its germination for 2 years, but has lost it after 4-5 years. Barley holds out well for 2-3 years, but drops to zero after 8 years. Oats, by the way, rarely lasts more than 11 years.

For some of the other field seeds the figures are as follows:

Grasses:	Bromus pratensis	2-3 years, dead after	4-5 years
	Timothy	2-3 years, dead after	7 years
	Bromus mallis	2-3 years, dead after	7 years
	Festuca pratensis	3-4 years, dead after	6 years
	Italian rye grass	4-6 years, dead after	8-10 years
	Dactylis glomerata	7 years, dead after	9 years

Legumes:	White clover	3-4 years, dead after (sometimes up to 7)	8 years
	Esparsette	3 years, dead after	4 years
	Alfalfa (average)	4-6 years, dead after	13 years

One selected, best alfalfa did much better. After 10 years 98% of this seed still germinated, after 18 years 93%, after 26 years there was still 82% germination. Unsorted seed of the same variety did not do so well, with 68% after 10 years and 38% after 26 years.

Short-keeping seeds with 1 year (at best 2 years) of germination include salsify, dandelion, savory (Satureia hortensis), sweet woodruff (Asperula odorata).

Others, grouped according to their keeping quality, are:

2 years:	corn, caraway.
2-3 years:	borage, parsley, fennel, dill, thyme, marjoram, rosemary, sage, onion.
2-4 years:	leek, (this sometimes lasts 5 years).
3-4 years:	cress, radish, pepper, carrots, celeriac (sometimes to 6 years), chervil, vermouth, hyssop, lamb's lettuce (Valerianella olitoria), bean, wrinkle-seeded peas (smooth-seeded peas last 6 years).
4 years:	beet, lettuce.
4-5 years:	spinach, cabbage, eggplant, tomato (up to 6 years), artichoke, chicory.
5 years:	kohlrabi, broad bean.
5 years and longer:	cucumber, melons, New Zealand Spinach. In the case of cucumbers and melons, second or third year seed is better than first year seed.

Here we might interrupt this catalogue of factual observations with a rather amusing incident out of World War I. Some Russian prisoners of war were told early one morning to go out to the fields connected with the prison camp and plant cucumbers. The officer in charge gave them the seed and went on to other duties. After a few hours he walked out to the cultivated area to see how the planting was progressing. No Russians!

Finally he found them, in the barracks, in bed, covered to the ears with blankets and sweating profusely.

"Do you call this planting cucumbers?", he barked at them. They were quite astonished.

"Yes, of course. This is the way we do it at home".

They had divided the seeds among themselves, each man putting his share into his socks, which he had then put on before starting his sweat bath.

"This way," they said, "they will germinate much better when we have sweated them out for a few hours".

Certainly it seems as though hormone and enzyme treatments, while not known to them as such, were here approximated in old peasant practices.

* * *

In the course of seed selection tests we sometimes made the observation, especially in the case of grains, that second-year seed germinated less but the plants growing from those which did germinate were stronger and inherited better from the parent plant — containing more protein and especially gluten than first year seed of the same lot.

The general rule, however, remains: *beware of old seed.* In case of doubt, you can make your germination test yourself. Sort out 100-200 seeds, put them on a tray or pan or shallow dish, the bottom of which is covered with a coarse filter paper or blotting paper. Moisten, but do not drench, with water. Keep dark, and renew water every so often. The seeds should never get dry; too much moisture, on the other hand, will cause mildew or other fungi to grow. The more even the temperature and moisture is, the better. For vegetable seed, temperatures between 60 and 68° F. are best.

Have only one layer of seeds, and this should not be crowded. Count the ones which have germinated after the proper time. For such tests, the seed should be covered with a second moist sheet, but so that air can circulate and the seed does not get choked.

Of course, in the laboratory one has incubators with temperature and moisture control for germination tests, but the simple procedure outlined above is quite adequate for home, farm or garden use, provided that the moisture conditions are evenly maintained.

Now comes the question: What is the "proper time" to allow for germination? Some seeds need only a day or two, others several days, to germinate. Garden cress is one of the fastest, taking less than one day, wheat takes a few days, oats three or four.

In nature we also observe the phenomenon of dormant seeds. Certain weeds, such as wild mustard and hedge mustard, can stay in the soil for many years and will germinate only if proper conditions again exist. They will stay dormant, f.i., under grass, clover, pasture or hay fields, but germinate at once when the field is plowed and again used for arable cultivation. Other seeds, such as birdsfoot trefoil, will germinate only a little in the first year, but the rest come up in the second and third year.

In general, the seed which germinates faster than another lot of the same species (or variety) and grows faster to a stronger plant, is preferable to the slow-germinating seed of the same kind.

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